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OBSERVATIONS OF TEACHER-PUPIL VERBAL BEHAVIOR DURING CRITICAL READING LESSONS.

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VERBAL INTERACTION BETWEEN TEACHERS AND PUPILS WHEN THEY ARE READING CRITICALLY IS REPORTED. SIX HUNDRED FIFTY-ONE CHILDREN AND 24 TEACHERS FROM SEVEN ELEMENTARY SCHOOLS IN COLUMBUS, OHIO, SERVED AS SUBJECTS DURING THE 9-MONTH INVESTIGATION. TWELVE CLASSES, TWO AT EACH OF THE SIX ELEMENTARY GRADE LEVELS, WERE GIVEN TRAINING IN CRITICAL READING WHILE 12 CLASSES WERE INSTRUCTED IN LITERATURE. TEACHER QUESTIONS AND STUDENT RESPONSES WERE THE MAIN FOCUS OF THE STUDY. AN INSTRUMENT WAS DEVISED FOR OBSERVING VERBAL BEHAVIOR. EIGHT CATEGORIES OF TEACHER QUESTIONS WERE INFLUENCED BY BLOOM'S APPROACH, AND FIVE PUPIL CATEGORIES, REPRESENTING LEVELS OF THOUGHT, WERE INFLUENCED BY GUILFORD'S STRUCTURE. TEACHERS WERE INFORMED OF FORTHCOMING CLASSROOM OBSERVATIONS WHICH TOTALED SIX IN NUMBER AND LASTED FOR 25 MINUTES. CHI-SQUARE WAS USED TO ANALYZE THE DATA. THE INCLUDED RESULTS INDICATED THAT--(1) THERE IS A DEFINITE RELATIONSHIP BETWEEN TEACHER QUESTIONS AND QUALITY OF PUPIL RESPONSES, (2) TEACHERS IMPROVED IN THEIR ABILITY TO ASK QUESTIONS, (3) TRAINING OF TEACHERS AND SPECIAL INSTRUCTIONAL MATERIALS INFLUENCED VERBAL BEHAVIOR, (4) LIMITED GRADE LEVEL TRENDS WERE DISCERNABLE IN TEACHERS QUESTIONS, AND (5) DEVELOPMENTAL TRENDS IN PUPIL RESPONSES WERE IDENTIFIABLE IN THE EXPERIMENTAL GROUP. TABLES AND THE OBSERVATION DIRECTIONS ARE INCLUDED. (BK)

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Despite widespread agreement that the development of critical readers is an esteemed goal of education, the attainment of this goal has been alarmingly slow. Several factors might be identified as inhibiting greater accomplishment in this area: vague and ambiguous concepts of the nature of critical reading, inadequate teaching methods and materials, or failure to understand the essential ingredients of the teaching processes that produce critical readers. Research undertaken at the Ohio State University[1] to test the feasibility of teaching elementary school children to read critically attempted investigated each of the above inhibiting factors. Steps were taken to refine, clarify, and verify a comprehensive definitior of critical reading; special materials and techniques for instruction in critical reading skills were developed and tested; and classroom teaching sessions were studied in order to better understand the significance of the verbal interaction between teachers and pupils when they are reading at the critical level. It is this third phase of the research study that is the subject of this paper; however, a brief description of the major study will provide essential background information.

The central purpose of the comprehensive study was to determine whether or not critical reading skills can be taught to elementary school pupils while growth and interest in other general reading skills is maintained. Several minor, but

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[1]This observational study was conducted as a part of Cooperative Research Project 2612 of the U.S. Office of Education, "Critical Reading of Elementary School Pupils." The principal investigators are Willavene Wolf, Charlotte Huck, and Martha King. Bernice Ellinger was the assistant study director.

important, questions related to this central problem were identified as follows: (1) What is the relationship between critical reading ability and other subject characteristics, such as general reading ability, intelligence, and personality factors; (2) What specific problems do teachers encounter as they engage in teaching critical reading; (3) Which of the critical reading skills can most effectively be taught in the elementary school; and (4) What is the relationship between classroom teaching procedures and the pupils' growth in critical reading?

To investigate these various questions, 651 children and 24 teachers from 7 elementary schools in the Columbus (Ohio) Metropolitan Area were involved in an intensive project that extended over nine months of the 1965-66 school year. The study was built around a non-equivalent control group design in which twelve classrooms (two at each grade level) were given special reading materials and instruction in critical reading; and the remaining twelve groups (designated the controls) were given no instruction in critical reading, but were provided an equal amount of instruction and specially prepared materials in selected areas children's literature. The research was conducted in the following four distinct, but overlapping, phases: (1) refining and verifying the definition of critical reading, (2) pilot observation of existing practices in teaching critical reading and of the effectiveness of staff-prepared lessons, (3) development of materials and techniques for teaching critical reading, (4) construction of tests to measure growth in critical reading, and (5) the final phase of conducting the major experiment, which included testing, instruction in critical reading, and observations of teaching sessions.

The Purpose of the Observation Study

Various kinds of printed tests were employed as the evaluation instruments for most aspects of the research study; however, they would not provide important data needed to understand the dynamics of teacher-pupil interaction during reading instruction. Developments in observational techniques in the general area of teacher behavior and success in the early pilot observation study, reported to AERA in 1966, led the researchers to organize procedures for controlled observations of reading classes. Research studies have indicated that the verbal behaviors of teachers and pupils are highly influential in pupils' learning. From an analysis of classroom language, Bellack[2] concluded that the teaching act has a definit structure which is controlled by the teacher through structuring and soliciting moves; the pupils' role in the structure is to respond to the soliciting moves of the teacher. In this primary role, the teacher's language is an important determiner of what the pupils learn. Taba[3] maintains that the questions teachers ask play a crucial role in the development of pupils' cognitive skills because they circumscribe the mental operations which pupils can perform and determine which modes of thought they learn.

Teacher's questions and the related pupil responses became the central concern of the present study which was designed to find out what kinds of teacher

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[2]Bellack, Arno A., and Davitz, Joel R. The Language of the Classroom, Meanings Communicated in High School Teaching. Cooperative Research Project No. 1497. New York: Columbia University, 1963. (Mimeographed)

[3]Taba, Hilda; Levine, Samuel; and Elzey, Freeman F. Thinking in Elementary School Children. Cooperative Research Project No. 1574. San Francisco, Calif.: San Francisco State College, 1964. (Mimeographed)

questions were most conducive to the production critical responses from pupils. Secondary purposes were (1) to ascertain if changes in the teachers' questions and corresponding pupil responses occurred during the time of the study (2) to identify the differences in verbal behavior of teachers and pupils at different grade levels, and (3) to compare the specified verbalizations of subjects in the control group with those of the experimental group.

Procedures

Observation Instrument

The collection of data related to the above purposes required an observation instrument that would permit qualitative as well as quantitative classification of both teacher and pupil utterances. Although existing observational instruments were tested, they did not adequately fulfill the requirements of this study. Therefore, an instrument composed of two related category systems was devised. Teachers' verbalizations were classified in one system, which was arranged vertically along the right hand of the scale, and pupils' responses were coded in the other system, which was placed horizontally across the top of the scale. (See Illustration A.

The eight categories that formed the classification system for the teachers' utterances were influenced somewhat by Bloom's approach to ways of ordering knowledge. Inasmuch as teachers assume the primary role of structuring discourse in the classroom and are usually concerned with both content and process objectives when teaching reading, it was reasoned that the Bloom categories would be useful in coding the teachers' structure of the reading-discussion lessons. Not all of the

categories identified by Bloom were used, and others were combined or re-named; however, his work was influential in the definition of each category. The eight teacher categories which consisted of specific facts, clarifying, interpreting, analyzing, applying, summarizing, evaluating and controlling, are defined in Illustration B.

The main criterion in determing the five pupils categories was the differentiation of levels of thinking that were evident in their responses. Here the mental operations as identified by Guilford in the structure of the intellect proved useful in defining the separate types of thinking. Guilford describes memory, cognition, convergent and divergent production, and evaluation as different types of thinking. These were adapted for this study and arranged in a continuum with memory and cognition grouped into level 2, convergent production designated as level 3, divergent production as level 4, and evaluative thinking as level 5. Responses were recorded at the lower end of the continuum (level 1) when they evidenced guessing or random thoughts. Responses that showed literal cognition, memory, or repeating information directly from the reading source or earlier discussions, were placed at the literal level (level 2). When children made inferences, reorganized reading material or extended the material through appropriate illustrations, these responses were recorded at level 3. Responses were placed in level 4 when children generalized, theorized, or hypothesized, or made unique application of the material read. Level 5 was reserved for responses that showed pupils had made an evaluative judgment, based upon established criteria, that were stated. Responses at levels 3, 4 and 5 were considered the most desirable ones since they reflected more pupil involvement in critical thinking which was sought throughout the study.

Observations

Six observations were made at regular intervals in each of the 24 classrooms resulting in a total of 144 observation records. The teachers were informed of the observations in advance and planned a reading-discussion lesson for the period. The experimental teachers taught critical reading lessons and the control teachers used the children's literature materials as the basis for reading and discussion. Time of each observation was limited to 25 minutes.

Three observers were trained to use the observation scale through repeated visits to classrooms and extensive use of tape recordings. On-the-spot categorization was made of both the teacher's utterances and the pupils' responses. Reliabilities of observations were checked periodically by the Spearman-Brown Prophecy Formula. Coeficients ranged between .67 and .97 with a mean of .84 Inter-reliability for pupil categories ranged between .61 and .87 with a mean of .73. Two observers participated in each observation. One classified the verbal behavior of both teachers and pupils; the other kept a companion record that identified by number and sex each pupil who spoke This coding provided data about the number of different pupils who participated in the discussions and the degree of participation of each of the sexes.

Results of the Study

In order to investigate differences between the verbal behavior of control teachers and experimental teachers and the corresponding differences between pupils in the control and experimental groups, chi square analyses were made. From the observed frequencies of teacher-pupil utterances, the chi square statistic

provided frequencies that might theoretically be expected in each category if no significant controlling factor were operating, and also identified the categories that were responsible for the over-all idfferences. Both the observed and the expected frequencies for each cell plus the chi square values for each row and column are presented in all but four of the tables provided in the illustrative materials. The level of significance set for all data was .01.

The data were first analyzed in terms of teachers' verbalizations, and secondly according to pupils' responses, including the data regarding the relationship between teachers' questions and the level of pupil responses. In the analysis of teachers' behaviors, the eighth category (controlling) was dropped because the expected frequency for each cell was less than 1.

Teacher Verbal Behavior

The teachers' verbalizations were first divided into statements and questions. Both the children's literature teachers (hereafter, referred to as the control group) and critical reading teachers (the experimental group) had a higher frequency of questions than statements. Seventy-nine per cent of all of the units of verbal behavior were questions. Eighty per cent of the critical reading teachers' and 77 per cent of the children's literature teachers' verbal units were questions.

Significant differences were found in the kinds of statements teachers made. As is shown in Table 1, control teachers apparently engaged more extensively in factual statements, whereas the experimental teachers made more analytical, summarizing, and evaluating remarks.

The two groups differed, also, in the kinds of questions they asked. (Table 2, Control teachers tended to ask questions that sought factual, interpreting, and applying responses; the experimental teachers tended to ask more of the clarifying, analyzing, and evaluating types of questions.

Because they were more directly related to pupil responses, only the teachers' questions were analyzed to answer the major questions pertaining to teachers' verbal behavior.

Grade Level Differences in Teacher Questions. Teachers' questions by grade level were examined for the control and experimental groups separately. Significant differences were found in the questioning behavior of control teachers at grades 2, 4 5 and 6. Inspection of Table 3 shows that (1) second grade teachers asked fewer specific fact and more clarifying and applying questions, (2) fourth grade teachers asked more analytical questions, (3) fifth grade teachers asked more specific fact and fewer clarifying and analyzing questions; and (4) sixth grade teachers asked more specific fact questions and fewer applying questions.

Among the experimental teachers, significant differences in questioning were found at grades 1, 2, and 6. These differences, as shown in Table 4, were due to the higher frequency of specific fact questions in grades one and two, of clarifying questions in grade two, and of summarizing and evaluating questions in grade six. In general, grade level data revealed no consistent gradual increase in use of more thought demanding questions at higher grade levels. Only in the area of evaluation does there appear to be a progression in emphasis in the intermediate grades and here the data are significant at sixth grade only.

Differences in Teacher Questions Over Time. In order to obtain data about changes in teachers' questions over time, two types of analyses were made. First the questions for the two groups of teachers were compared for three time segments: fall, winter, and spring. Secondly, the questions for each group were analyzed separately, to detect changes that occurred within the group. Tables 5, 6, and 7 show that for each time segment, the types of questions asked by control and experimental teachers differed significantly. In the fall, differences were due to greater emphasis on specific fact and interpreting questions by control teachers as contrasted with greater use of clarifying, analyzing and applying questions by experimental teachers.

Differences in the winter were caused by the higher frequencies of interpreting and applying questions among the control teachers and of analyzing and evaluating questions among the experimental teachers. By the time of the spring observations, both groups of teachers had decreased their use of specific fact and clarifying questions. The differences that existed were due to greater use of interpreting, analyzing, and evaluating questions by the experimental teachers and greater use of applying questions by control teachers.

As is shown in Table 8, significant change over time occurred in the control teachers' use of three types of questions: specific fact, clarifying, and applying. Emphasis on specific fact and clarifying questions decreased from fall to spring but the use of applying questions increased. Experimental teachers changed questioning behavior in more categories than the control teachers. Table 9 indicates that significant differences were found in the specific fact, clarifying, interpreting, applying, and evaluating categories. From fall to spring experimental

teachers had decreased their emphasis on specific fact, clarifying and applying questions; maintained the use of analyzing questions; and increased their use of the interpreting and evaluating types.

Pupil Responses

As stated earlier, pupil responses were tallied along a continuum which was divided into five categories representing levels of thought. Table 10 presents the total frequencies of responses at each level for both the control and experimental groups. Significant differences between the responses of the two groups of pupils were found at all levels, except level 1, random response. Apparently, the control pupils' responses contained more literal statements, (repeating material from reading sources, level 2), and organizing and applying data (level 3), whereas the experimental group frequently moved to higher levels of thinking, such as hypothesizing (level 4) and evaluating (level 5).

Level of Response by Question Type. The main purpose of this observation study was to ascertain the relationship between the teachers' questions and the levels of responses given by pupils. When teachers' questions were compared to pupil responses for the control group (Table 11), significant differences in pupils responses were found for all question types except that of clarifying. Specific fact questions produced more literal responses (level 2), while interpreting questions generated higher levels of thinking (levels 3 and 4), which include inferring, applying, organizing, hypothesizing, and theorizing. Analyzing questions brought fewer literal statements (level 1) and more hypothesizing-theorizing (level 4) responses. Applying questions brought fewer level 1 and 2 and more level 3 responses while

summarizing questions elicited more hypothesizing (level 4) responses. The evaluative questions, though few in number, brought higher frequencies of response at level 5, and fewer at the literal level.

In the experimental group (Table 12) significant differences were found for all questions typed except that of summarizing, which was the least used category. As with the control group, specific fact questions resulted in more literal, repeating information (level 2) responses and fewer responses at the highest three levels. Clarifying questions caused pupils to respond more frequently at levels 2 and 3, and less frequently at levels 4 and 5. Interpreting questions elicited more level 3 and 4 responses; analyzing questions, however, prompted, not only more level 3 and 4 responses, but also more at level five. Applying questions brought significantly more level 3 responses and fewer at level 2. The evaluative questions stimulated higher frequencies of pupil responses at levels 4 and 5. Data for both the control and experimental groups show that interpretive, analytical, and evaluative questions are the most effective ones in eliciting the higher levels of responses from pupils.

Grade Level Differences in Pupil Responses. Differences in levels of responses that occurred between grade levels are shown in Tables 13 and 14. In the control group differences in responses were found between grades 1, 2, 3, and 4; however, inspection of Table 13 shows that these differences were due only to the pupils' responses at levels 1 (random response) and 4 (hypothesizing). Apparently, pupils in grade 2 gave more than the expected number of level 4 responses while pupils in grades 1 and 3 made fewer responses at this level. Fourth grade differences can be accounted for only by the fact that those pupils gave fewer than the expected number

of random responses.

Responses of experimental pupils (Table 14) show significant differences between all grade levels and in the utilization of all five levels of response. Differences in grades 1 and 2 were due to higher frequencies in the lower two response levels and fewer frequencies at level 3. Pupils in grade 3, 4, and 6 gave fewer literal (level 2) responses and more of the interpreting, applying, theorizing, and evaluating types.

From grade three through six, higher frequencies of responses occurred at level 3, inferring, applying responses; also, there was a progression of increasingly higher frequencies in level 5, the evaluative, responses. Generally, pupils in grades five and six produced more responses reflecting higher levels of thinking than did the pupils in grades one and two.

Changes in Pupil Responses Over Time.

To discover changes in pupils' production of critical responses over the time of the experimental period, the observational data were organized into fall, winter, and spring sequences for the control and experimental groups separately. Tables 15 and 16 show the total observed and expected frequencies of responses for each of the three time segments. In the fall the control pupils (Table 16) gave level 2 (literal) responses with higher frequencies; these decreased, but not significantly, in the winter and continued to decrease to a significant degree in the spring. The significant differences shown in the winter were due to the high frequency of level 3 responses. The utilization of the higher categories of thinking - levels 3,

4, and 5 - increased from fall to spring, significantly contributing to the changes in pupil behavior.

Differences in experimental pupils' responses, as shown in Table 15, are significant only for the spring observations. Level 3, giving illustrations and interpreting, partially contributed to this difference but perhaps more important is the difference shown in level 5, evaluative thinking. Although responses in both levels 4 and 5 show gradual increases from fall through winter to spring, differences were not significant, except at level 5 in the spring. No changes occurred in the level 2 (literal) responses over the time of the study. This continued even use of literal responses may have been due to the fact that new substantive materials, requiring considerable literal understanding, were introduced to the experimental group throughout the winter and spring segments of the study.

Conclusions and Discussion

The data compiled in this study support the findings of other research which indicate that the teacher plays a central role in determining the mode and depth of pupils' thinking, as revealed through their verbal responses. The teachers' expectations of pupils, as communicated through their questions, especially, strongly influence the intellectual effort expended by the pupils when responding. The interpreting, analyzing, applying, and evaluating questions tended to bring higher levels of response from children in both groups than the specific fact or clarifying questions. The experimental teachers asked more analyzing, summarizing, and evaluating questions than the control teachers and their children responded more frequently with higher levels of thinking.

A second conclusion from the study is that teachers did change their questioning technique. Both groups of teachers in this study improved their questioning habits during the time of the study. Just the fact that they were being regularly observed may have prompted the teachers to give more attention to the structure of their lessons. Control teachers decreased their use of fact questions and increased their use of applying questions. Experimental teachers used with increasing frequency interpreting, analyzing, and evaluating questions. Both special teacher training and instructional materials might reasonably be credited for the improvement in teacher questioning. The differences in questioning behavior during the fall observations were probably due to the different emphases in the summer training workshops for the two populations. The changes that occurred from fall to spring can be attributed to the influence of the instructional materials because only two special training sessions were held for teachers during that time. The children's literature materials, which were provided the control teachers, were selected to enrich and extend various curricular areas. It is not surprising, therefore, that these teachers employed factual, interpreting, and applying questions. On the other hand, critical reading materials, which were designed to cause pupils to analyze, compare, infer, and judge, contained suggested questions of these types for the teachers. Apparently, the teachers learned to use the questions of this type because the spring observations showed heavy use of interpreting, analyzing, and evaluative questions.

One category of questions was generally ignored by both groups of teachers. Only at the sixth grade level in the experimental group did frequencies in the summarizing category account for significant differences in teacher behavior. Analysis of the recordings, tapescripts, and the observed data regarding teachers' statements,

suggested that the teachers tended either to provide the summarizing comments themselves, or to omit them.

Teachers' questioning behavior revealed only slight grade level trends, such as a gradual increase in more thought-demanding questions at the higher grade levels. Although fifth and sixth grade teachers in the experimental group asked more summarizing and evaluating and fewer specific fact questions than the first and second grade teachers, there was no consistent trend from grade to grade. Differences that existed between control grades were due apparently to different teaching styles. Although the data for all twenty-four teachers show improvement in questions asked, apparently established personal habits of questioning persisted. Some teachers, regardless of grade level taught, favored factual and applying questions; others emphasized analytical and evaluative questions. On the other hand, the data might be interpreted to mean that the more thought demanding questions were considered by some teachers to be appropriate for primary children.

Both groups of pupils increased their production of critical responses during the time of the study; however, the experimental group excelled the control group in giving responses at the highest, or evaluative thinking, level. The experimental group also showed a gradual increase in the production of the higher levels responses in the upper grades; no pattern of grade level trends emerged for the control pupils.

In summary, this study indicated that (1) there is a definite relationship between teacher questions and the quality of pupil responses, (2) teachers did improve their ability to ask questions, (3) training of teachers and special

instructional materials made a difference in teachers' questioning behavior and in the corresponding pupil responses, (4) only limited grade level trends were discernable in teachers' questions, and (5) finally, developmental trends in pupil responses were identifiable only in the experimental group.

OBSERVATIONS OF TEACHER-PUPIL VERBAL BEHAVIOR DURING CRITICAL READING LESSONS

(Illustrative Materials)

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Illustration A

	Gives Statement	Asks Questions	LEVEL 1 Unsupported Guessing Random Response	LEVEL 2 Literal Recall Memory Cognition	LEVEL 3 Making Inferences Giving Illustration Applying Information Interpreting Convergent	LEVEL 4 Theorizing Hypothesizing Divergent	LEVEL 5 Evaluating Judging Giving Support for Stand Using Criteria
Gathering Specific Facts							
Clarifying							
Interpreting Inferring From Facts							
Analyzing							
Applying							
Summarizing Concluding							
Evaluating							

Illustration B

DIRECTIONS FOR USING THE OBSERVATION SCALE

The Unit of Verbal Behavior

The unit of verbal behavior to be categorized is a "thought unit" defined as a remark or series of remarks which express a complete idea, or serve a specific function. Generally, it will be all words spoken by one person at one time. If the speaker makes a transition from one category to another while speaking, a new UVB is indicated and observers record it.

The completion of a UVB is not determined by its length but according to its content. A new number is recorded every time a transition to a new category is made.

TEACHER VERBAL BEHAVIOR

There are seven categories for teacher behavior: gathering facts, clarifying, interpreting or inferring, analyzing, applying, summarizing and evaluating. Each of the teacher categories is sub-divided into statements and questions. The teacher may be gathering specific facts by giving them to the students in a lecture or by asking questions of the students which will bring specific facts before the group. When the teacher is reading to the students, showing audio-visual materials, or using a resource person to present information, a number is recorded under giving statements in the gathering specific facts category.

All teacher talk that is intended to bring information to the attention of the group is recorded as gathering specific facts. It includes fact stating, reporting information from books and authorities, getting the main idea, reading from a book, or requesting information from pupils. When audio-visual materials or resource people are used to present information, this will be recorded as giving specific facts or other appropriate category of teacher talk.

Examples: What is the author saying?
What is the advertisement telling you?
Read the part that tells what he did.

A clarifying statement or question is one used to refine previously discussed ideas or those misinterpreted by members of the group. It includes defining, clarifying a concept through an illustration, emphasizing a prior point, rephrasing, or making the meaning clear. Parroting statements are ignored unless an idea is expanded.

Examples: Do you mean this?
Could you say it another way?

An interpreting or inferring statement or question is one which goes beyond the literal meaning. It includes interpreting figurative language, inferring beyond the literal message, translating information into more comprehensible language.

Examples: What kind of person do you think he is?
What else is the author saying?
What group of people would be interested in an article like this?

An analyzing statement or question is intended to separate or distinguish component parts of a situation, a piece of writing, or a phrase. It includes examining the nature and relationship of the parts, searching for the organizational pattern or principles, or determining the internal consistency of a piece of writing or an argument.

Examples: Does the conclusion necessarily follow?
Is this the only conclusion that could be drawn from these statements?
How do you know there is a moral in the story?
How is this news story put together?

An applying statement or question is one in which the teacher makes or asks a student to make some direct application of information or criteria related to the lesson. It includes applying information to illustrate a point, applying criteria to be used in evaluation, and illustrating a generalization or a principle in a specific instance.

Examples: According to our time line, what period does this event fall into?
Illustrate from the list of techniques for developing characters the way this author develops the character in this story.

A summarizing statement or question synthesizes several preceding statements of fact and may show the relationship among several of those statements. It includes a summary; resume of events or an integration of several pieces of information.

Examples: What were the most important parts of what we learned?
If you had to use one word to tell about this story, what would you use?

An evaluative statement or question is one in which a judgment is made based upon established criteria. It includes personal interpretation or judgments about the quality or accuracy of printed material. A child may use his own set of personal values as the set of criteria or use criteria established by the group.

Examples: Do you agree with John?
Why do you think it is well written?
Are you going to accept his conclusion?

PUPIL RESPONSES

A student response is seldom classified as critical or non-critical on the basis of the correctness of the content of the response but on the basis of the reasoning involved.

Level 1: Random Response. When there is unsupported guessing in response to a teacher's comment or question, a number is recorded in this column. If a child says "I don't know," it is recorded here. "I like," "I don't like" statements are considered random responses unless they are justified by further verification or show the use of data to make a decision, whereupon they become critical.

Level 2: Non-Critical - Literal. Non-critical responses are those which can be directly drawn from the material in the lesson. They will include factual answers, literal comprehension, reporting verbatim, and repeating previously agreed upon material.

Level 3 Giving Illustrations, Applying, Interpreting. Responses in which children give illustrations, interpret material or apply information are recorded at Level 3. These responses are frequently those in which a child gives an example from his own life which is similar to the point under discussion.

Level 4 Hypothesizing, Theorizing. Pupil responses which go beyond the information available to the group are recorded in this category. They include going beyond the data extrapolating, or diverging from the material before the group.

Level 5 Critical Thinking Evaluating, Judging, Using Criteria. Responses recorded at Level 5 are ones in which students go beyond the literal meaning of printed matter, use data in an evaluative decision, make a judgment about the accuracy or quality of writing, see deeper meanings in the material, or recognize the fallibility of printed materials. Judgments must be supported with evidence and evaluations must be based upon established criteria.

Table 1

TEACHER STATEMENTS CONTROL - EXPERIMENTAL
BY STATEMENT TYPE

	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Control	208	69	51	30	28	49	23	458	36.17*
Experimental	141	90	38	80	43	103	52	547	30.29*
Total	349	159	89	110	71	152	75	1005	
Chi-Square	27.68*	.30	4.9	14.85*	1.07	10.89*	6.71*		66.46*

*Significant at the .01 level.

Table 2

TEACHER QUESTIONS CONTROL - EXPERIMENTAL
BY QUESTION TYPE

	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Control	(396) 500	(99) 73	(312) 447	(449) 238	(193) 246	(28) 18	(79) 34	1556	234.60*
Experimental	(563) 460	(141) 167	(445) 310	(638) 849	(274) 222	(39) 49	(113) 158	2215	164.80*
Total	960	240	757	1087	468	67	192	3771	
Chi-Square	46.38*	11.64*	98.81*	168.22*	24.66*	5.72	43.94*		399.41*

*Significant at the .01 level.

Table 3

TEACHER QUESTIONS FOR CONTROL GROUP
GRADE LEVEL BY QUESTION TYPE

Grade	Gather Specific Facts	Clarify	Inter-pret	Analyze	Apply	Summar-ize	Eval-uate	Total	Chi-Square
	(93)	(14)	(83)	(44)	(46)	(3)	(6)		
1	91	14	96	42	38	2	6	289	4.04
	(82)	(12)	(73)	(39)	(40)	(3)	(6)		
2	34	24	70	47	69	3	7	254	62.96*
	(73)	(11)	(65)	(35)	(36)	(3)	(5)		
3	72	8	57	35	47	2	5	226	5.31
	(84)	(12)	(75)	(40)	(41)	(3)	(6)		
4	73	13	69	58	32	8	8	261	21.33*
	(83)	(12)	(74)	(39)	(41)	(3)	(6)		
5	118	5	66	21	42	2	3	257	30.26*
	(86)	(13)	(77)	(41)	(43)	(3)	(6)		
6	112	9	89	35	18	1	5	269	27.00*
Total	500	73	447	238	246	18	34	1556	
Chi-Square	51.98*	18.12*	6.20	19.45*	41.83*	10.65	2.66		150.92*

*Significant at .01 level.

Table 4

TEACHER QUESTIONS FOR EXPERIMENTAL GROUP
GRADE LEVEL BY QUESTION TYPE

Grade	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
1	(82) 117	(30) 16	(55) 53	(151) 147	(39) 30	(9) 5	(28) 26	394	25.65*
2	(86) 136	(31) 52	(58) 58	(159) 119	(41) 27	(9) 6	(30) 16	414	65.22*
3	(56) 36	(21) 21	(38) 44	(104) 122	(27) 32	(6) 3	(19) 14	272	15.22
4	(55) 42	(20) 15	(37) 33	(102) 111	(27) 37	(6) 4	(19) 23	265	11.23
5	(92) 76	(33) 36	(62) 58	(169) 178	(44) 48	(10) 11	(31) 34	441	4.27
6	(89) 53	(32) 27	(60) 64	(164) 172	(43) 48	(9) 20	(31) 45	429	35.10*
Total	460	167	310	849	222	49	158	2215	
Chi-Square	72.01*	22.52*	1.94	14.74	13.17	16.57*	15.73*		156.72*

*Significant at .01 level.

Table 5

TEACHER QUESTIONS FOR CONTROL AND EXPERIMENTAL GROUP BY QUESTION TYPE IN THE FALL

Group	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Control	249	16	185	88	75	10	11	634	109.62*
Experimental	147	70	77	256	125	20	29	724	95.99*
Total	396	86	262	344	200	30	40	1358	
Chi-Square	41.72*	27.25*	60.25*	61.56*	6.78*	2.15	5.92		205.61*

*Significant at the .01 level.

Table 6

TEACHER QUESTIONS FOR CONTROL AND EXFERIMENTAL GROUP BY QUESTION TYPE IN THE WINTER

Group	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Control	177	38	133	70	83	5	13	519	91.27*
Experimental	184	71	84	285	52	21	51	748	63.32*
Total	361	109	217	355	135	26	64	1267	
Chi-Square	9.72*	1.68	37.08*	66.25*	23.50*	5.08	11.29*	154.5	154.59*

*Significant at the .01 level.

Table 7

TEACHER QUESTIONS FOR CONTROL AND EXPERIMENTAL GROUP BY QUESTION TYPE IN THE SPRING

Group	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Control	74	19	129	80	88	3	10	403	85.01*
Experimental	129	26	149	308	45	9	78	744	46.04*
Total	203	45	278	388	133	12	88	1147	
Chi-Square	.15	.99	15.48*	35.87*	56.19*	.54	21.81*		131.06*

*Significant at the .01 level.

Table 8

TEACHER QUESTION TYPE BY TIME VISITED - CONTROL

Time	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Fall	(204) 249	(30) 16	(182) 185	(97) 88	(100) 75	(7) 10	(14) 11	634	25.20*
Winter	(167) 177	(24) 38	(149) 133	(79) 70	(82) 83	(6) 5	(11) 13	519	11.55
Spring	(130) 74	(19) 19	(116) 129	(62) 80	(64) 88	(5) 3	(9) 10	403	40.78*
Total	500	73	447	238	246	18	34	1556	
Chi-Square	34.47*	14.00*	3.29	7.41	15.62*	1.73	.99		77.52*

*Significant at the .01 level.

Table 9

TEACHER QUESTION TYPE BY TIME VISITED - EXPERIMENTAL

Time	Gather Specific Facts	Clarify	Interpret	Analyze	Apply	Summarize	Evaluate	Total	Chi-Square
Fall	(150) 147	(55) 70	(101) 77	(277) 256	(73) 125	(16) 20	(52) 29	724	60.60*
Winter	(155) 184	(56) 71	(105) 84	(287) 285	(75) 52	(17) 21	(53) 51	748	21.32*
Spring	(154) 129	(56) 26	(104) 149	(285) 308	(75) 45	(17) 9	(53) 78	744	68.61*
Total	460	167	310	849	222	50	158	2216	
Chi-Square	9.58*	24.29*	29.28*	3.51	56.68*	5.44	21.75*		150.53*

*Significant at the .01 level.

Table 10

LEVEL OF PUPIL RESPONSES TO TEACHER QUESTIONS FOR CONTROL AND EXPERIMENTAL

Group	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
Con	(109) 96	(1031) 1180	(1479) 1649	(472) 420	(370) 114	3459	225.57*
Exper	(122) 134	(1146) 993	(1644) 1472	(525) 577	(411) 667	3843	202.88*
Total	230	2173	3121	997	781	7302	
Chi-Square	2.66	41.53*	37.20*	10.92*	336.13*		428.45*

*Significant at the .01 level.

Table 11

LEVEL OF RESPONSE BY QUESTION TYPE
FOR CONTROL GROUP

Question Type	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
Gather specific facts	(28) 47	(346) 728	(483) 207	(123) 27	(33) 4	1013	694.34*
Clarify	(4) 3	(46) 58	(64) 65	(16) 6	(4) 3	135	10.31
Interpret	(28) 28	(338) 150	(473) 621	(120) 168	(33) 25	992	171.86*
Analyze	(15) 4	(185) 130	(259) 270	(66) 118	(18) 21	543	66.74*
Apply	(18) 9	(225) 92	(315) 450	(80) 83	(22) 26	660	142.65*
Summarize	(1) 3	(14) 15	(20) 8	(5) 15	(1) 0	41	31.47*
Evaluate	(2) 2	(26) 7	(36) 28	(9) 3	(2) 35	75	447.34*
Total	96	1180	1649	420	114	3459	
Chi-Square	28.76*	639.99*	271.24*	165.78*	458.93*		1564.71*

*Significant at the .01 level.

Table 1a

LEVEL OF RESPONSE BY QUESTION TYPE
FOR EXPERIMENTAL GROUP

Question Type	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
Gather specific facts	(23) 36	(174) 463	(257) 138	(101) 22	(117) 13	672	698.11*
Clarify	(8) 9	(61) 89	(91) 117	(36) 15	(41) 7	237	60.46*
Interpret	(20) 22	(147) 111	(218) 284	(85) 102	(99) 50	569	56.37*
Analyze	(55) 38	(406) 215	(601) 665	(236) 281	(272) 371	1570	145.78*
Apply	(13) 10	(98) 51	(145) 195	(57) 70	(66) 52	378	46.40*
Summarize	(3) 3	(23) 27	(34) 22	(14) 19	(16) 19	90	8.08
Evaluate	(11) 16	(84) 37	(125) 51	(49) 68	(57) 155	327	249.91*
Total	134	993	1472	577	667	3843	
Chi-Square	14.79	642.84*	155.66*	98.11*	353.71*		1265.10*

*Significant at the .01 level.

Table 13

LEVEL OF PUPIL RESPONSE
BY GRADE FOR CONTROL GROUP

Grade	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illustrns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
1	(15) 25	(179) 190	(251) 247	(64) 40	(17) 24	523	19.57*
2	(14) 8	(172) 148	(240) 242	(61) 94	(17) 11	503	25.43*
3	(13) 25	(164) 164	(229) 240	(58) 37	(16) 14	480	18.76*
4	(23) 6	(280) 291	(392) 398	(100) 105	(27) 22	822	14.11*
5	(15) 19	(178) 167	(249) 246	(64) 75	(17) 16	523	4.33
6	(17) 13	(206) 220	(288) 276	(73) 69	(20) 27	605	5.06
Total	96	1180	1649	420	114	3459	
Chi-Square	34.83*	5.89	1.30	37.06*	8.19		87.27*

*Significant at .01 level.

Table 14

LEVEL OF PUPIL RESPONSE
BY GRADE FOR EXPERIMENTAL GROUP

Grade	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
1	(22) 30	(164) 200	(244) 208	(95) 91	(110) 106	635	16.33*
2	(19) 26	(142) 215	(211) 168	(82) 63	(96) 78	550	56.75*
3	(20) 20	(147) 107	(218) 256	(85) 131	(99) 55	569	61.30*
4	(20) 22	(150) 106	(222) 248	(87) 88	(101) 120	584	21.85*
5	(25) 8	(185) 212	(275) 283	(107) 70	(125) 143	716	31.63*
6	(27) 28	(203) 153	(301) 309	(118) 134	(137) 165	789	19.90*
Total	134	993	1472	577	667	3843	
Chi-Square	16.88*	87.91*	23.80*	43.97*	35.20*		207.77*

*Significant at .01 level.

Table 15

LEVEL OF PUPIL RESPONSE
BY TIME FOR EXPERIMENTAL GROUP

Time	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
Fall	(41) 35	(30) 315	(446 481	(175 170	(20. 163	1164	1: 88
Winter	(45) 58	(33) 327	(49. 5?9	19. 177	(22. 190	128:	12.95
Spring	(49. 41	(36) 351	(535. 462	(2.0. 230	(242 314	1398	34.62*
Total	134	993	147.	577	667	3843	
Chi-Square	5.98	1.01	15.85*	3.28	33.23*		59.35*

*Significant at .01 level.

Table 16

LEVEL OF PUPIL RESPONSE
BY TIME FOR CONTROL GROUP

Time	Level of Response 1 Guessing Random	2 Literal Memory	3 Inferring Applying Illust'ns.	4 Theoriz. Hypoth.	5 Evaluating Criteria	Total	Chi-Square
Fall	(33) 52	(401) 605	(560. 437	(143. 68	(39. 12	1174	200.29*
Winter	(33. 28	(408) 353	(570. 650	(145. 133	39. 32	1196	21.83*
Spring	(30. 16	(372 222	(519. 562	(132 219	(36 70	1089	159.75*
Total	96	1180	1649	420	114	3459	
Chi-Square	19.08*	177.00*	41.60*	96.96*	52.23*		381.87*

*Significant at .01 level.